WHAT IS CLAIMED IS:

1. A method of hematopoietic cells transplantation comprising the steps of:

(a) obtaining hematopoietic cells to be transplanted from a donor;

(b) providing said cells *ex-vivo* with conditions for cell proliferation and, at the same time, for reducing a capacity of said cells in utilizing cooper, thereby expanding a population of said cells, while at the same time, inhibiting differentiation of said cells; and

(c) transplanting said cells to a patient.

2. The method of claim 1, wherein said donor and said patient are a single individual.

3. The method of claim 1, wherein obtaining said hematopoietic cells is from a source selected from the group consisting of peripheral blood, bone marrow, neonatal umbilical cord blood and embryonic stem cells.

4. The method of claim 3, wherein obtaining said hematopoietic cells further includes enriching said cells for stem cells.

5. The method of claim 3, wherein obtaining said hematopoietic cells further includes enriching said cells for progenitor cells.

6. The method of claim 1, wherein reducing said capacity of the cells in utilizing copper is effected by a transition metal chelator having an affinity to copper.

7. The method of claim 6, wherein said transition metal chelator is selected from the group consisting of polyamine chelating agents, ethylendiamine, diethylenetriamine, triethylenetetramine, triethylenediamine, tetraethylenepentamine, aminoethylethanolamine, aminoethylpiperazine, pentaethylenehexamine, triethylenetetramine-hydrochloride, tetraethylenepentamine-hydrochloride, pentaethylenehexamine-hydrochloride, tetraethylpentamine, captopril, penicilamine, N,N'-bis(3-aminopropyl)-1,3-propanediamine, N,N,Bis (2 animoethyl) 1,3 propane diamine, 1,7-dioxa-4,10-diazacyclododecane, 1,4,8,11-tetraaza cyclotetradecane-5,7-dione, 1,4,7-

triazacyclononane trihydrochloride, 1-oxa-4,7,10-triazacyclododecane, 1,4,8,12-tetraaza cyclopentadecane, 1,4,7,10-tetraaza cyclododecane.

8. The method of claim 1, wherein providing the cells with said conditions for cell proliferation include providing the cells with nutrients and with cytokines.

9. The method of claim 8, wherein said cytokines are early acting cytokines.

10. The method of claim 9, wherein said early acting cytokines are selected from the group consisting of stem cell factor, FLT3 ligand, interleukin-6, thrombopoietin and interleukin-3.

11. The method of claim 8, wherein said cytokines are late acting cytokines.

12. The method of claim 11, wherein said late acting cytokines are selected from the group consisting of granulocyte colony stimulating factor, granulocyte/macrophage colony stimulating factor and erythropoietin.

13. The method of claim 1, wherein said cells are derived from a source selected from the group consisting of bone marrow, peripheral blood and neonatal umbilical cord blood.

14. The method of claim 1, wherein said cells are enriched for hematopoietic $CD_{34}+$ cells.

15. The method of claim 1, wherein said cells are selected from the group consisting of non-differentiated stem cells and committed progenitor cells.

16. A method of genetically modifying stem cells with an exogene comprising the steps of:

(a) obtaining stem cells to be genetically modified;

(b) providing said cells *ex-vivo* with conditions for cell proliferation and, at the same time, for reducing a capacity of said cells in utilizing cooper, thereby expanding a population of said cells, while at the same time, inhibiting differentiation of said cells; and

(c) genetically modifying said cells with the exogene.

17. The method of claim 16, wherein genetically modifying is effected by a vector including the exogene.

18. The method of claim 16, wherein reducing said capacity of the cells in utilizing copper is effected by a transition metal chelator having an affinity to copper.

19. The method of claim 18, wherein said transition metal chelator is selected from the group consisting of polyamine chelating agents, ethylendiamine, diethylenetriamine, triethylenetetramine, triethylenediamine, tetraethylenepentamine, aminoethylethanolamine, aminoethylpiperazine, pentaethylenehexamine, triethylenetetramine-hydrochloride, tetraethylenepentamine-hydrochloride, pentaethylenehexamine-hydrochloride, tetraethylpentamine, captopril, penicilamine, N,N'-bis(3-aminopropyl)-1,3-propanediamine, N,N,Bis (2 animoethyl) 1,3 propane diamine, 1,7-dioxa-4,10-diazacyclododecane, 1,4,8,11-tetraaza cyclotetradecane-5,7-dione, 1,4,7-triazacyclononane trihydrochloride, 1-oxa-4,7,10-triazacyclododecane, 1,4,8,12-tetraaza cyclopentadecane, 1,4,7,10-tetraaza cyclododecane.

20. The method of claim 16, wherein providing the cells with said conditions for cell proliferation include providing the cells with nutrients and with cytokines.

21. The method of claim 20, wherein said cytokines are early acting cytokines.

22. The method of claim 21, wherein said early acting cytokines are selected from the group consisting of stem cell factor, FLT3 ligand, interleukin-6, thrombopoietin and interleukin-3.

23. The method of claim 20, wherein said cytokines are late acting cytokines.

24. The method of claim 23, wherein said late acting cytokines are selected from the group consisting of granulocyte colony stimulating factor, granulocyte/macrophage colony stimulating factor and erythropoietin.

25. The method of claim 16, wherein said cells are derived from a source selected from the group consisting of bone marrow, peripheral blood and neonatal umbilical cord blood.

26. A method of adoptive immunotherapy comprising the steps of:

(a) obtaining progenitor hematopoietic cells from a patient;

(b) providing said cells *ex-vivo* with conditions for cell proliferation and, at the same time, for reducing a capacity of said cells in utilizing cooper, thereby expanding a population of said cells, while at the same time, inhibiting differentiation of said cells; and

(c) transplanting said cells to the patient.

27. The method of claim 26, wherein reducing said capacity of the cells in utilizing copper is effected by a transition metal chelator having an affinity to copper.

28. The method of claim 27, wherein said transition metal chelator is selected from the group consisting of polyamine chelating agents, ethylendiamine, diethylenetriamine, triethylenetetramine, triethylenediamine, tetraethylenepentamine, aminoethylethanolamine, aminoethylpiperazine, pentaethylenehexamine, triethylenetetramine-hydrochloride, tetraethylenepentamine-hydrochloride, pentaethylenehexamine-hydrochloride, tetraethylpentamine, captopril, penicillamine, N,N'-bis(3-aminopropyl)-1,3-propanediamine, N,N,Bis (2 animoethyl) 1,3 propane diamine, 1,7-dioxa-4,10-diazacyclododecane, 1,4,8,11-tetraaza cyclotetradecane-5,7-dione, 1,4,7-triazacyclononane trihydrochloride, 1-oxa-4,7,10-triazacyclododecane, 1,4,8,12-tetraaza cyclopentadecane, 1,4,7,10-tetraaza cyclododecane.

29. The method of claim 26, wherein providing the cells with said conditions for cell proliferation include providing the cells with nutrients and with cytokines.

30. The method of claim 29, wherein said cytokines are early acting cytokines.

31. The method of claim 30, wherein said early acting cytokines are selected from the group consisting of stem cell factor, FLT3 ligand, interleukin-6, thrombopoietin and interleukin-3.

32. The method of claim 29, wherein said cytokines are late acting cytokines.

33. The method of claim 32, wherein said late acting cytokines are selected from the group consisting of granulocyte colony stimulating factor, granulocyte/macrophage colony stimulating factor and erythropoietin.

34. The method of claim 26, wherein said cells are derived from a source selected from the group consisting of bone marrow, peripheral blood and neonatal umbilical cord blood.

35. The method of claim 26, wherein said cells are enriched for hematopoietic $CD_{34}+$ cells.

36. The method of claim 26, wherein said cells are selected from the group consisting of non-differentiated stem cells and committed progenitor cells.

ADA
AZ